AMENDMENTS TO THE CLAIMS

1. (currently amended) A negative charge pump formed on a semiconductor substrate comprising:

a power supply having- a first terminal~~connected to said substrate~~ that acts as ground and a second terminal connected to a high voltage rail;

a plurality of charging capacitors connected between said high voltage rail and said ~~substrate~~ground, wherein some of the said charging capacitors are connected to said high voltage rail by a first set of transistor switches and connected to said ~~substrate~~ ground by a second set of transistor switches;

an output capacitor connected between said high voltage rail and said substrate~~charging capacitors~~, wherein the said output capacitor is connected to at least one of the said charging capacitors, through the output capacitor substrate, by a third set of transistor switches;

a configuration wherein, by controlling the transistor switches, the negative charge pump produces output voltages that are one, one and a half, and two times the power supply voltage; and

wherein said second and third sets of switches are NMOS transistors and said first set of switches are PMOS transistors~~switches~~.

2. (original) The negative charge pump of Claim 1 further including a supervisory circuit operative in a shutdown mode to catch the output voltage to said negative supply voltage.

3. (original) The negative charge pump of Claim 1 wherein at least one of said second set of switches is formed from a plurality of transistors that are staggered in switching on during a soft start mode.

4. (New) A negative charge pump means for generating an output voltage that is a multiple of an input voltage, formed on a semiconductor substrate, the pump means comprising:

a power supply means for providing input power to the pump at an input voltage, having a first terminal that acts as ground and a second terminal connected to a high voltage rail;

a plurality of input charging means for storing and discharging electrical energy, connected between said high voltage rail and said ground, wherein some of the said input charging means are connected to said high voltage rail by a first set of switches and connected to said ground by a second set of switches;

an output charging means for storing and discharging electrical energy, connected between said high voltage rail and said substrate, wherein the said output charging means is connected to at least one of the said input charging means, through the substrate, by a third set of switches;

a configuration wherein, by controlling the transistor switches, the pump means produces output voltages that are one, one and a half, and two times the input voltage; and

wherein said second and third sets of switches are NMOS transistors and said first set of switches are PMOS transistors.

5. (New) The negative charge pump means of Claim 4 further including a supervisory circuit means operative in normal operation and in shutdown mode for catching the output voltage to said negative supply voltage to prevent forward bias of the substrate.

6. (New) The negative charge pump means of Claim 4 wherein at least one of said second set of switches is formed from a plurality of transistors that are staggered in switching on during a soft start mode.

7. (New) A method of multiplying an input voltage to a circuit on a semiconductor substrate, the method comprising:

providing an input voltage having a ground and a high voltage rail that is at a more positive potential with respect to the ground;

charging a plurality of input capacitors that are connected between said high voltage rail and said ground;

connecting at least one of the said input capacitors to said high voltage rail by a set of PMOS transistor switches and to said ground by a set of NMOS transistor switches; connecting at least one output capacitor between said high voltage rail and said substrate;

connecting the substrate to at least one of the said input capacitors by a set of NMOS transistor switches; and

configuring the switches such that controlling the switches produces an output that is one, one and a half, or two times the input voltage.